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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/766,348
Filing Date: January 19, 2001
Appellant(s): QIU ET AL.

Edwin V. Merkel
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 28 January 2008 appealing from the Office action mailed 26 February 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

a. Bauer (US Patent 5, 850,015, filed June 1995), supplied by Applicant as Exhibit 4.

b. Beer et al (US Patent, 6,174,717, filed July 1992), supplied by Applicant as Exhibit5.

c. Tampakaki et al (2000, Molec. Plant Microbe Interact. 13:1366-1374), supplied by Applicant as Exhibit 6.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

a. Claims 41, 49-51, 53, 58-61, 69-71, 73, 75-77, 80, 82 and 84 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Neither the instant specification nor the originally filed claims appear to provide support for recitation of a "promoter that is not pathogen-inducible" in claims 41, 61 and 75, line 5. The only reference to plant promoters in the specification, on pg 36, line 19, states "various promoters including pathogen-induced promoters".

Thus, at the time of filing, the only promoters contemplated were pathogen-induced promoters or promoters in general, which included pathogen-induced ones. Promoters other than pathogen-induced ones as a class were not part of the originally filed invention. As detailed in

the enablement rejection, the knowledge of those in skill in the art at the time of filing was that use of non-inducible promoters in expression of a harpin in a plant would kill the plant. The knowledge of the existence of constitutive promoters, i.e. promoters that are non-pathogen inducible, was such that one of skill in the art would expect that Applicant would have mentioned constitutive promoters if they were contemplated at the time of filing.

Thus, the recitation "that is not pathogen inducible" constitutes new matter.

b. Claims 41, 49-51, 53, 58-61, 69-71, 73, 75-77, 80, 82 and 84 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contain subject matter that was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The claims are broadly drawn to a method of imparting pathogen resistance to plants by planting a seed transformed with a construct comprising a nucleic acid encoding a hypersensitive response elicitor (harpin) of SEQ ID NO:1, 3, 5, or 7 and a non-pathogen inducible promoter and propagating a plant from the seed or by transformation of a plant with the construct.

The instant specification, however, only provides guidance for methods of treating seeds of a number of plant species with SEQ ID NO:1, growing the plant, exposing it to one of a variety of plant pathogens, and observing that plants grown from treated seeds with more pathogen resistant than plants grown from non-treated seeds (examples 1-8). The guidance related to expression of a nucleic acid encoding SEQ ID NO:1, 3, 5, or 7 in a plant is very general (specification, pg 36, line 6, to pg 37, line 12); however, plant transformation in general

was well-known to those of skill in the art at the time of filing.

The instant specification fails to provide guidance for a method of imparting pathogen resistance to plants by planting a seed transformed with a construct comprising a nucleic acid encoding a hypersensitive response elicitor of SEQ ID NO:1, 3, 5, or 7 and a non-pathogen inducible promoter and propagating a plant from the seed or by transformation of a plant with the construct. Specifically, the specification fails to provide guidance for the use of a constitutive, non-pathogen inducible, promoter in such constructs.

At the time of filing, constitutive expression of harpins in plants was considered lethal. For example, Bauer (US Patent 5, 850,015, filed June 1995) in discussing the expression in plants of a nucleic acid encoding the instant SEQ ID NO:1 states at column 13, lines 21-27:

> Transformation of plants with the DNA molecule of the present invention is particularly useful where the plant does not exhibit a hypersensitive response to pathogens or is weakly responsive to such pathogens. **This requires that $hrpN_{ech}$ be hooked up to the promotor of a plant gene that the pathogen induces such as PAL, CHS, etc. Otherwise, hrpN will kill the plant.** *(emphasis added)*

Beer et al (US Patent, 6,174,717, filed July 1992) expressed a similar belief that expression of HrpN would kill plant cells at column 24, lines 9-22):

> Still another use would be the fusion of the gene encoding harpin to specific promoters of plant genes to develop specific transgenic plants. **When the plant gene is "turned on", harpin would be expressed and the plant cell killed.** Some appropriate plant gene promoters and their projected uses include genes involved in pollen development (resulting in the development of male sterile plants); genes that are expressed in response to infection by fungi, e.g. genes encoding phenylalanine ammonia lyase and chalcone synthase the plant cell would be killed thereby limiting the progress of the fungus and making the plant resistant to fungal diseases); and genes involved in the development of senescence (to facilitate harvest, expression of hrp genes would result in defoliation). *(emphasis added)*

It is noted that two of the inventors on this patent are two of the instant inventors, Steven Beer and Zhong-Min Wei.

This view was prevalent until 2000, 3 years after the filing of the parent of the instant application. Tampakaki et al (2000, Molec. Plant Microbe Interact. 13:1366-1374) initially expressed a harpin in plants using an inducible promoter because they "expect[ed] that endogenously produced harpin may be lethal to the plant" (pg 1367, left column, paragraph 4), but to their amazement found that even when large amounts of the biologically active harpin was constitutively produced in plants, the plants showed no necrosis (pg 1367, left column, paragraph 4, to pg 1369, left column, paragraph 1).

Thus, given the state of the art at the time of filing, one of skill in the art would not have expected a constitutive promoter to function in the instant invention because one of skill in the art would have expected expression in a plant of a harpin from a constitutive promoter to kill the plant.

The instant specification makes no teaching as to the use of a constitutive promoter in expression of harpins in plants. Its only teaching with respect to plant promoters is the following on pg 36, lines 17-19:

> As is conventional in the art, such transgenic plants would contain suitable vectors with various promoters including pathogen-induced promoters

Given the state of the art at the time of filing, use of non-inducible promoters would need to be taught by the specification.

The specification also does not teach any working examples in which a plant was transformed with a construct comprising a nucleic acid encoding a hypersensitive response elicitor (harpin) of SEQ ID NO:1, 3, 5, or 7 and a non-pathogen inducible promoter.

Given the state of the art at the time of filing, the amount of direction provided by the inventor in the specification, and the lack of existence of working examples, the instant invention

was not enabled at the time of filing.

(10) Response to Argument

a. Claims 41, 49-51, 53, 58-61, 69-71, 73, 75-77, 80, 82 and 84 do not comply with the written description requirement.

Appellant argues that various promoters, as recited in the specification, would include all types of promoters, including the constitutive promoters cited in Koncz et al, Rogers et al, and Fraley et al, and one of skill in the art would understand these to be included (Brief, pg 6)

However, the knowledge of those of skill in the art at the time of filing was that use of non-inducible promoters in expression of a harpin in a plant would kill the plant, as detailed in the 35 USC 112, 1st, enablement rejection. The knowledge of the existence of constitutive promoters, i.e. those promoters that are not pathogen inducible, would suggest that Applicant would have specifically mentioned constitutive promoters if they were contemplated at the time of filing.

Appellant argues that Koncz et al, Rogers et al and Fraley et al were published or issued 6-17 years before the filing of the present application, and it was well-known that those constitutive promoters could be used in plants (Brief, pg 6-7).

However, it was also believed by those of skill in the art at the time of filing and several years later at that use of non-inducible promoters in expression of a harpin in a plant would kill the plant.

Appellant argues that because non-pathogen-inducible promoters were well-known in the art at the time of filing, the present application clearly intended to cover not just the use of pathogen-inducible promoters but others (Brief, pg 7).

However, the art at the time of filing stated that pathogen-inducible promoters were required, as detailed in the 35 USC 112, 1st, enablement rejection. Thus, without an explicit statement indicating that constitutive promoters, for example, are contemplated or that expression from other than inducible promoters would not kill the plant, use of such promoters is new matter.

Appellant argues that one of ordinary skill in the art would not understand from reading the specification would not construe the specification as teaching only the use of pathogen-inducible promoters; non-pathogen-inducible promoters would be considered as encompassed (Brief, pg 8).

However, one of ordinary skill in the art at the time of filing would believe that use of such promoters would result in death of the plant, and thus would not consider them encompassed.

Appellant argues that nowhere does the specification limit the claimed promoter to only a pathogen-inducible promoter (Brief, pg 8).

However, the knowledge of those in skill in the art at the time of filing would limit the promoter to an inducible one, as it was believed that expression of a harpin in a plant would kill the plant cells in which the harpin was expressed. The expectation that use of constitutive promoters in expression of a harpin in a plant would kill the plant, as detailed in the 35 USC 112, 1st, enablement, rejection, is the reason for the need to mention constitutive promoters.

b. Claims 41, 49-51, 53, 58-61, 69-71, 73, 75-77, 80, 82 and 84 do not comply with the enablement requirement.

Appellant argues that Bauer and Beer et al do not adequately represent the state of the art at the time of filing, as both were filed well before the instant filing date (Brief, pg 9).

However, Appellant has provided no evidence that the thinking in the art had changed by the time of filing. In contrast, the Examiner has provided evidence, in the form of Tampakaki et al, that even 3 years after the filing of the parent of the instant application, it was thought that constitutively expressing harpin would be lethal to the plant.

Appellant argues that compared to when Bauer and Beer et al were filed, much more information was available regarding constitutive expression of HR elicitors in plants; for example, use of constitutive promoters was well known before December 1997 (Brief, pg 9).

However, use of constitutive promoters was well known before the filing of each of Bauer and Beer et al. Each of Bauer and Beer et al explicitly state that expression of harpin in a plant would result in death, requiring use of pathogen-inducible promoters to overcome that problem.

Appellant argues that the Second Wei Declaration presents data about Arabidopsis transformation with a gene construct containing the hrpN gene operably linked to the weakly constitutive NOs promoter, showing that this was not lethal (Brief, pg 9-10).

However, the Second Wei Declaration presents no indication of the date in which these experiments were performed. All that is known is that they were done on or before 11 August 2004. If, for example, they were done after the publication of Tampakaki et al, or any time after

the filing of the parent of the instant application, they would provide no support for Appellant's implication that it was known at the time of filing that constitutive promoters would not result in cell death. Further, given the absoluteness of the statements both Beer et al and Bauer quoted above, one would expect that, if, in the intervening time, it had been found that constitutive expression did not result in plant death, a statement to that effect would have been in the instant specification.

Appellant argues that the statement of Tampakaki et al that "endogenously produced harpin *may* be lethal to the plant" is not a definitive statement of the state of the art; nowhere does Tampakaki et al say that this was the prevalent view, nor does Tampakaki et al teach that only pathogen-induced promoters could be used. Appellants thus assert that it would have been reasonable for one of ordinary skill in the art to conclude that using a constitutive promoter would not be lethal (Brief, pg 10).

However, Tampakaki et al, in conjunction with Beer et al and Bauer, show a clear, uninterrupted belief in the art that constitutive expression of hrpN in a plant would be lethal. Appellant has provided no evidence that there was a change in this view in the art between the filing of Beer et al and Bauer and the filing of the instant application.

Appellant argues that use of non-inducible promoters was taught by the specification at pg 36, lines 17-21, but the examiner seems to be requiring working examples (Brief, pg 10).

However, the examiner is not requiring working examples. The examiner, in light of the state of the art at the time of filing, is saying that absent a teaching in the specification that promoters like constitutive promoters can be used in the instant invention, use of such promoters to express hrpN in plants was not enabled.

Appellant argues that at the time of filing the basic techniques and components required to transform a plant with a foreign gene were well-known in the art, citing Koncz et al, Beer et al, Bauer, Fraley et al and Rogers et al; one of skill in the art could have, without undue experimentation, determined which promoters fell into the non-pathogen inducible category. Appellant argues that the Second Wei Declaration confirms that a constitutive promoter is effective and non-lethal (Brief, pg 10-11).

However, plant transformation, per se, is not what is not enabled. The Second Wei Declaration does nothing to indicate that the state of the art at the time of filing was other than that use of constitutive promoters would result in death of the plants. Tampakaki et al, in conjunction with Beer et al and Bauer, show a clear, uninterrupted belief in the art at the time of filing that constitutive expression of hrpN in a plant would be lethal. There is no statement in the specification to contradict this view.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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